

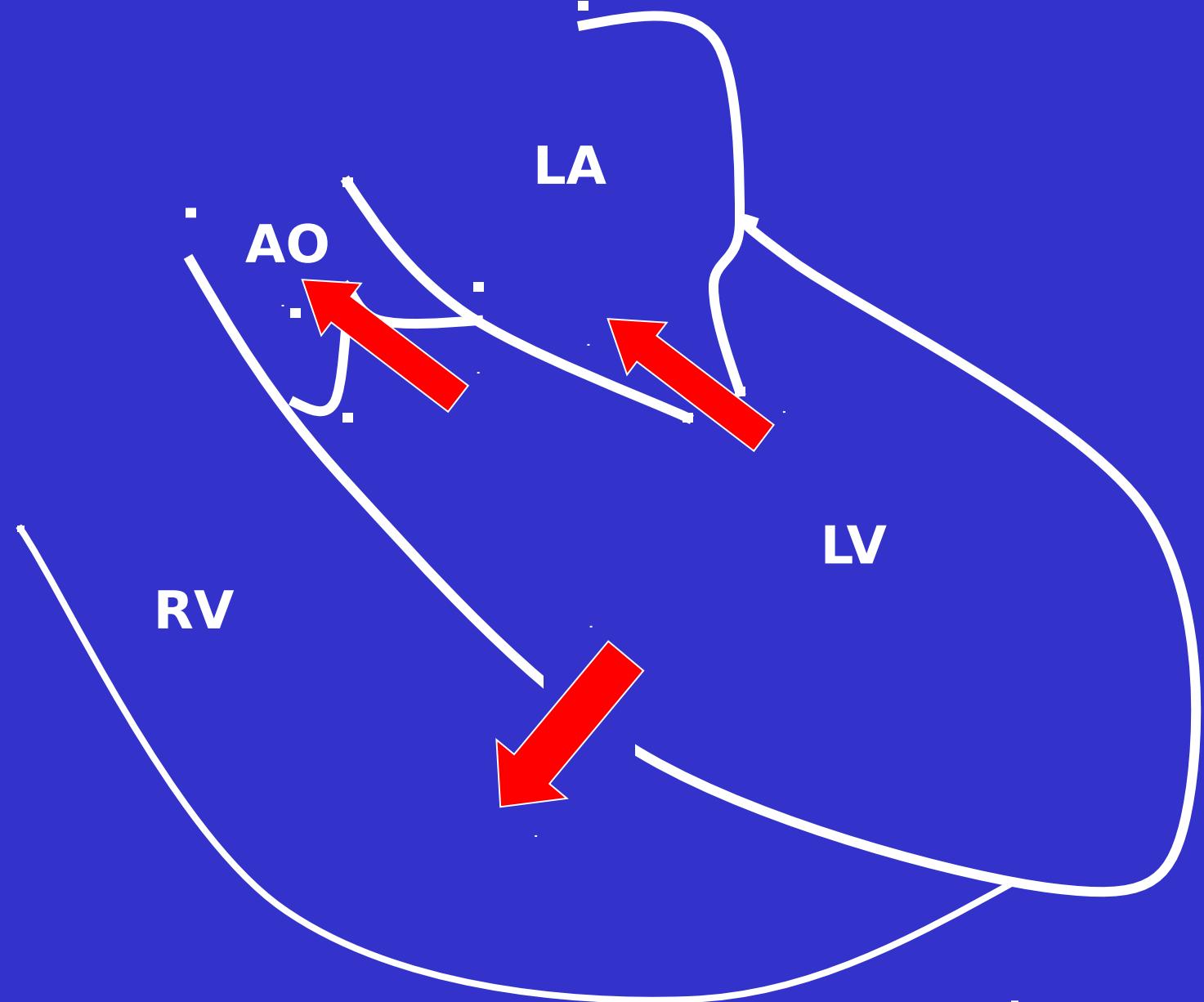
Cardiac Auscultation

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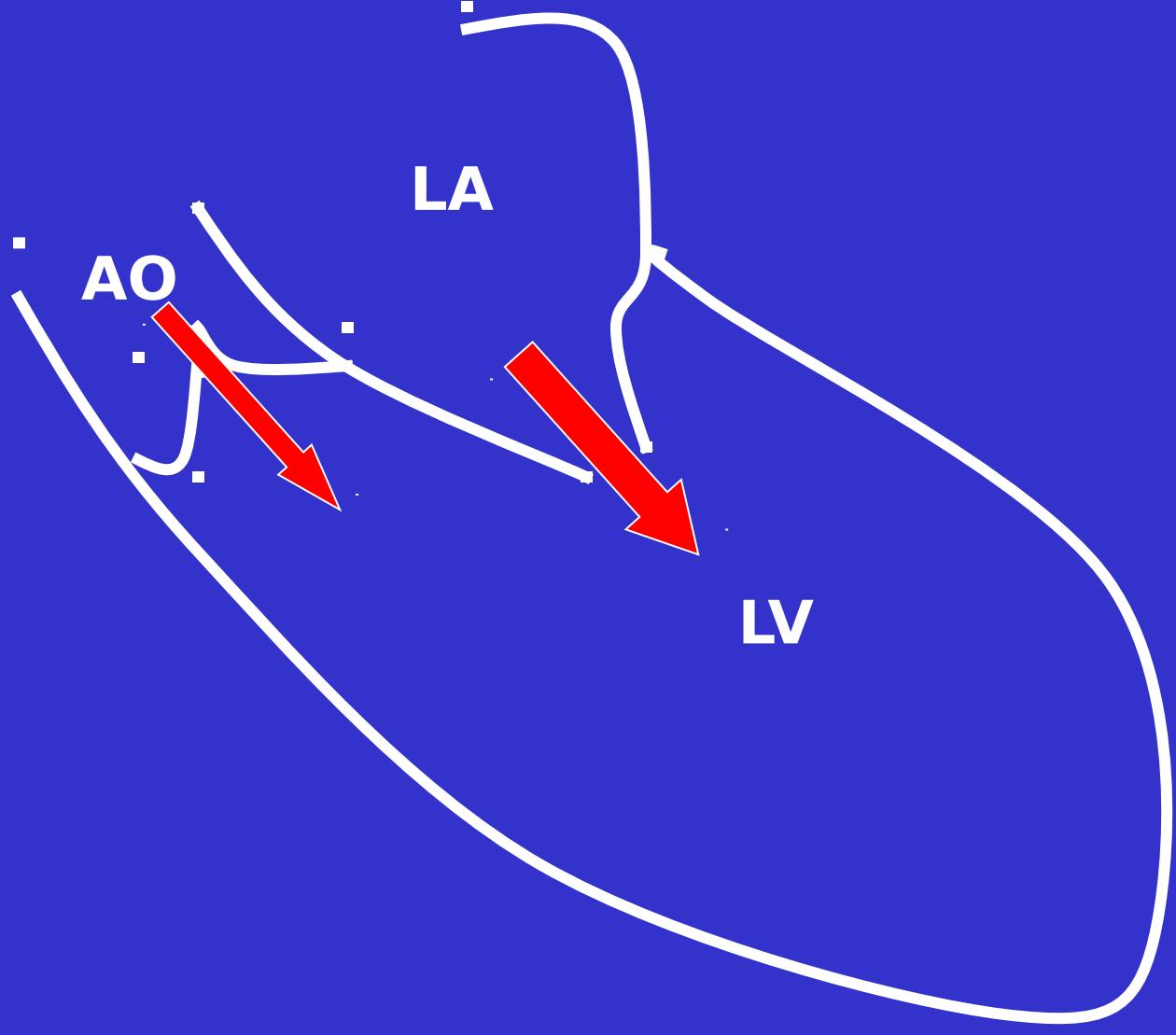
Third Heart Session

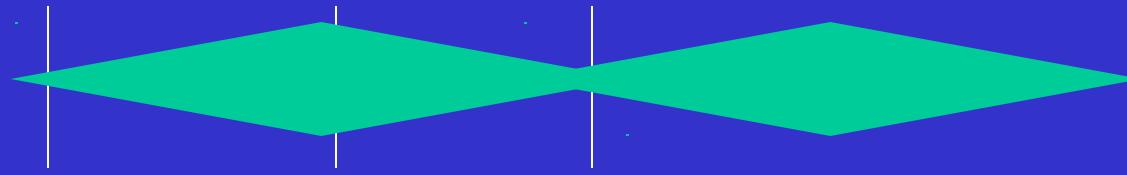
- Questions
- To and fro vs. continuous murmurs
- Examination of carotids and JVP
- The Cardiac Exam
- Last Chance Questions

Systole



Diastole

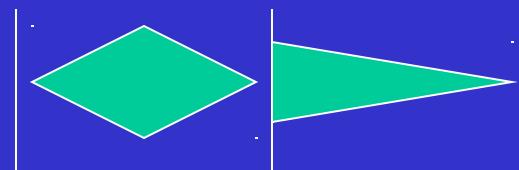




S1 S2

S1

Continuous Murmur



S1

S2

S1

“To and Fro” Murmur

Continuous murmur does not pause at S1 or S2; flows from the end of systole into diastole.

Continuous Murmur

- Implies pressure gradient that is present throughout systole and diastole
 - i.e. pressure gradient never zero
- Artery-artery fistula (I.e. PDA, coronary-PA fistula)
- Arteriovenous Fistula
- Mammary Souffle
- Venous Hum

TABLE 6-2.—LIST OF CARDIOVASCULAR ABNORMALITIES WHICH MAY BE ASSOCIATED WITH CONTINUOUS MURMURS*

Acyanotic Cardiovascular Disease

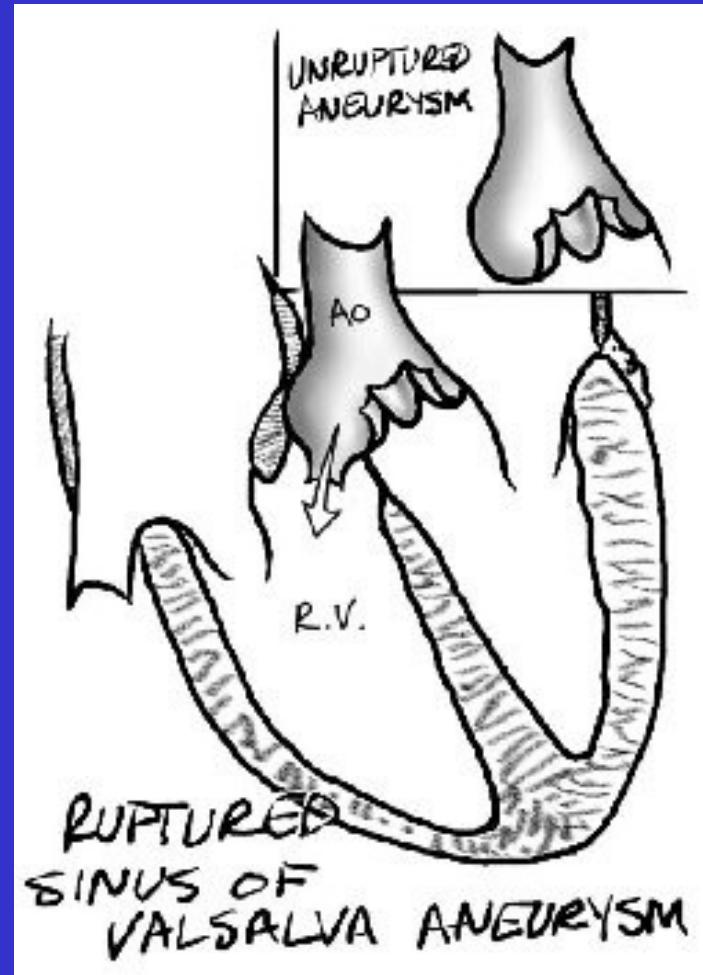
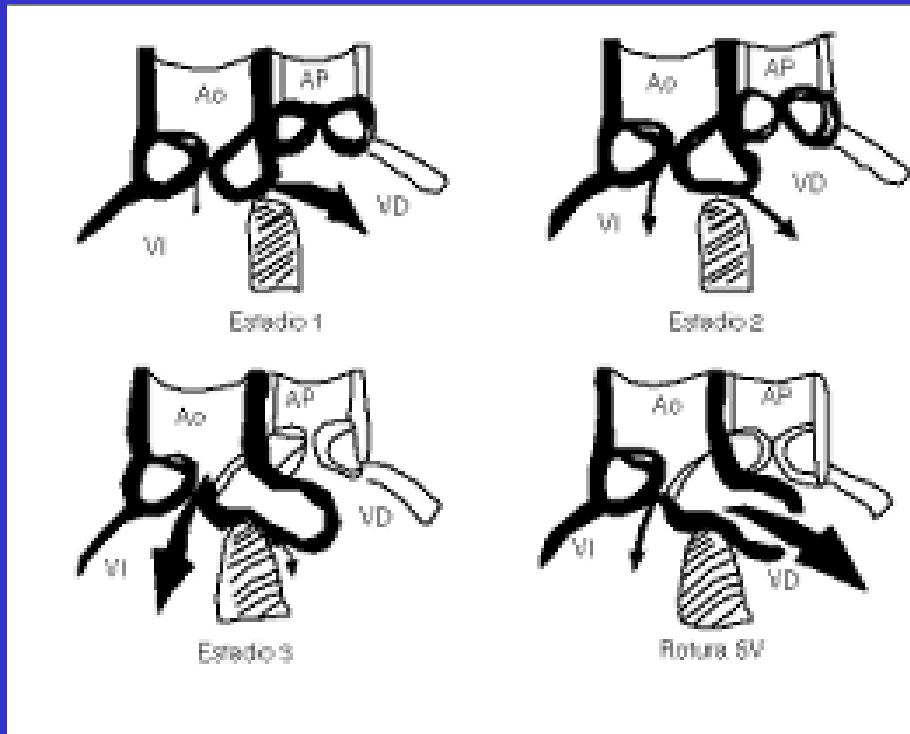
- Patent ductus arteriosus
- Aortopulmonary septal defect
- Rupture of aortic aneurysm into pulmonary artery
- Coronary arterial fistula (Roos *et al.*, 1970)
- Ruptured aneurysm of sinus of Valsalva
- Constriction of a main pulmonary artery
 - Congenital
 - Secondary to thromboemboli (Claudio *et al.*, 1970)
 - or compression by aortic aneurysm (Schrire *et al.*, 1963)
 - or lymph node enlargement (Levin and Booth, 1960)
- Coarctation of aorta
- Arteriovenous fistulas in general
 - Systemic
 - Pulmonary
- Mammary souffle
- Constriction of peripheral artery
- Mitral stenosis combined with atrial septal defect (Aykent *et al.*, 1965)
- Venous hum

Cyanotic Congenital Heart Disease

- Total anomalous pulmonary venous drainage into superior vena cava or right atrium
- Truncus arteriosus
- Tetralogy of Fallot
- Pulmonary and tricuspid atresia
- After Blalock's or Potts' shunt operation

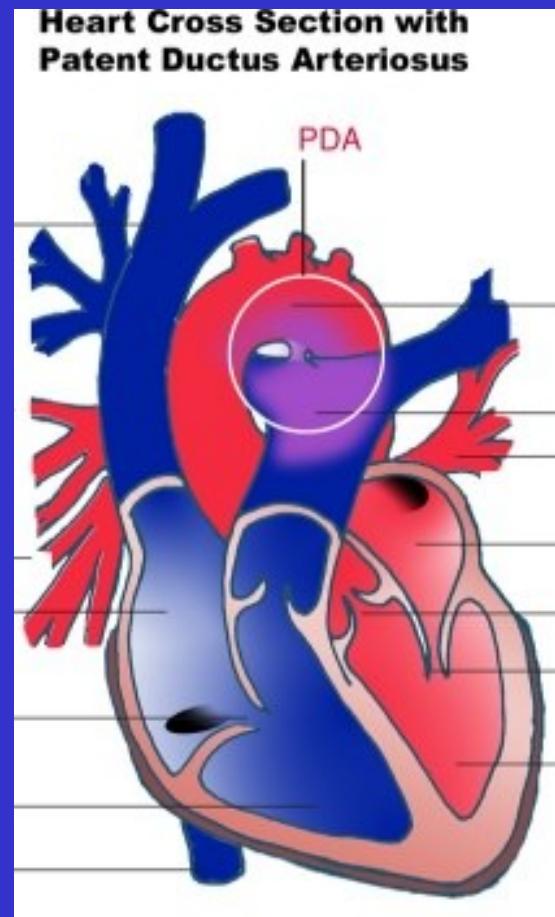
* Adapted from Ongley, 1964.

Sinus of valsalva aneurysm and rupture



Patent Ductus Arteriosus

- Remnant of fetal circulation
- If small shunt, may be tolerated for decades
- Large shunt results in pulmonary hypertension, right-to-left shunt
 - “differential cyanosis”
 - Toes blue but fingers pink

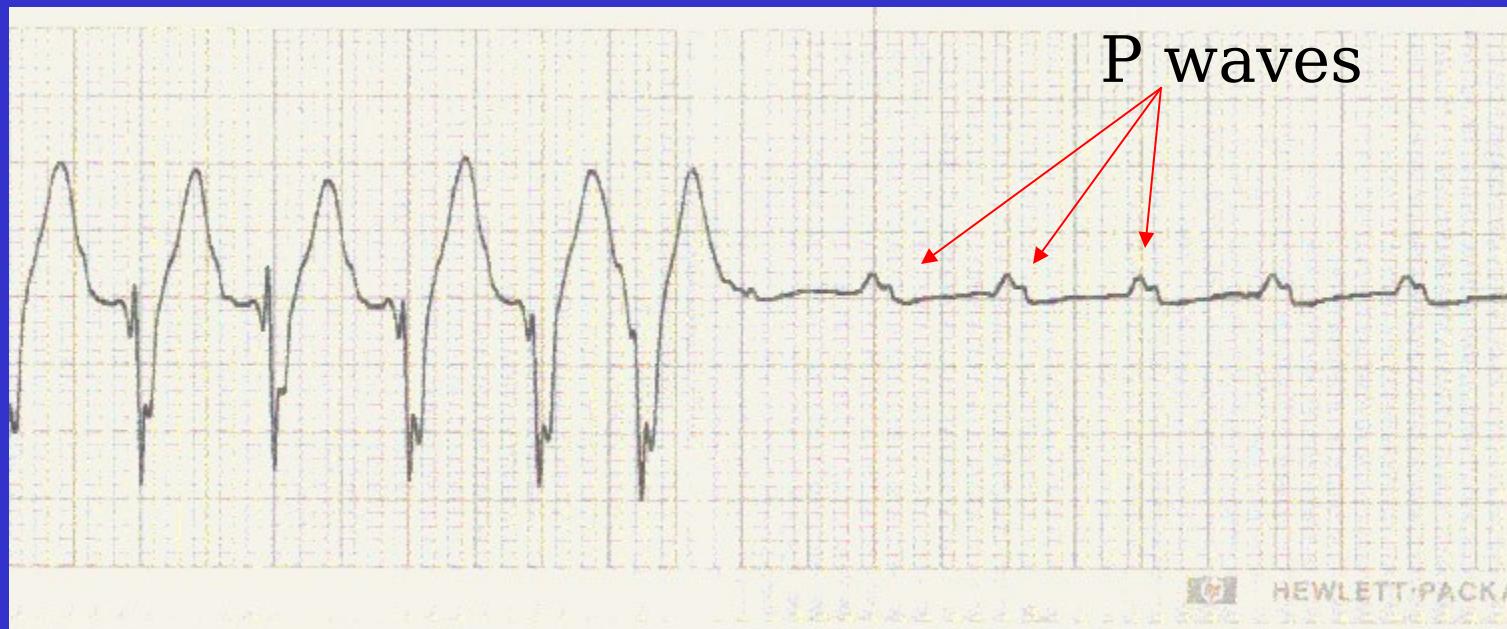


“To and Fro” Murmur

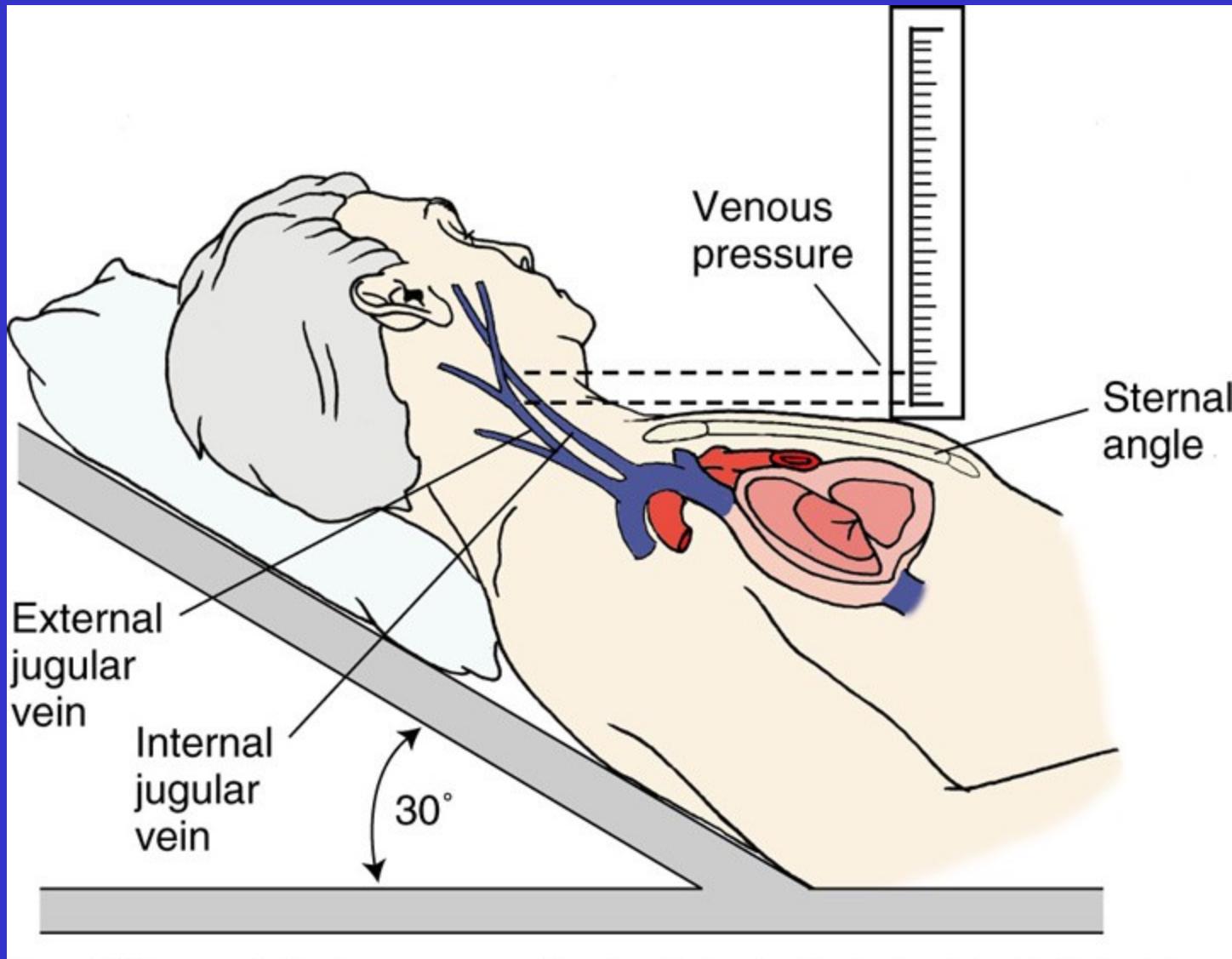
- Brief pause to murmur present
- Implies that the pressure is equalized between two chambers at the end of systole
- Aortic stenosis and regurgitation
- Mitral stenosis and regurgitation

Carotids

- Listen first
- Press gently in the elderly



Jugular Veins



Minimum Cardiac Exam

Patient Sitting Upright

Inspect from straight ahead or right side

Is patient comfortable? Tachypneic? Restless?

Vitals!

Tachycardia?

Rhythm regular, irregular, irregularly irregular?

Neck veins flat?

Carotid upstrokes, listen

Lean forward

Chest

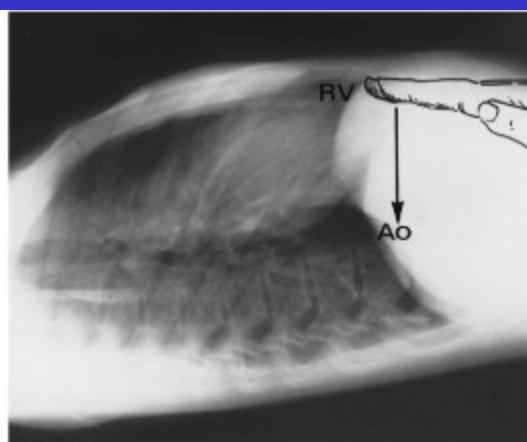
Supplement exam as necessary- look for radiation, do maneuvers

Minimum Cardiac Exam

- Supine
- Palpate precordium - heaves?
Thrills? PMI-less than quarter?
 - Listen to all 4 locations (and points in between) with diaphragm, then bell, then lay in L lateral decubitus.
Palp carotid for timing
 - Palpate other pulses



A



B



C



D



E



F

Minimum Cardiac Exam

- Document everything- "Not documented, not done"

What if you hear something?

- **Is it systolic, diastolic, or both?**
 - **What is the pattern?**
- **Where is it loudest?**
- **Does it radiate?**
- **Are there other associated findings?**
 - **S2 splitting normal, loud P2, gallop sound?**
- **Maneuvers**

MS

MR/TR/VS

AS with ES

PS with ES

AR

MS with OS

PDA

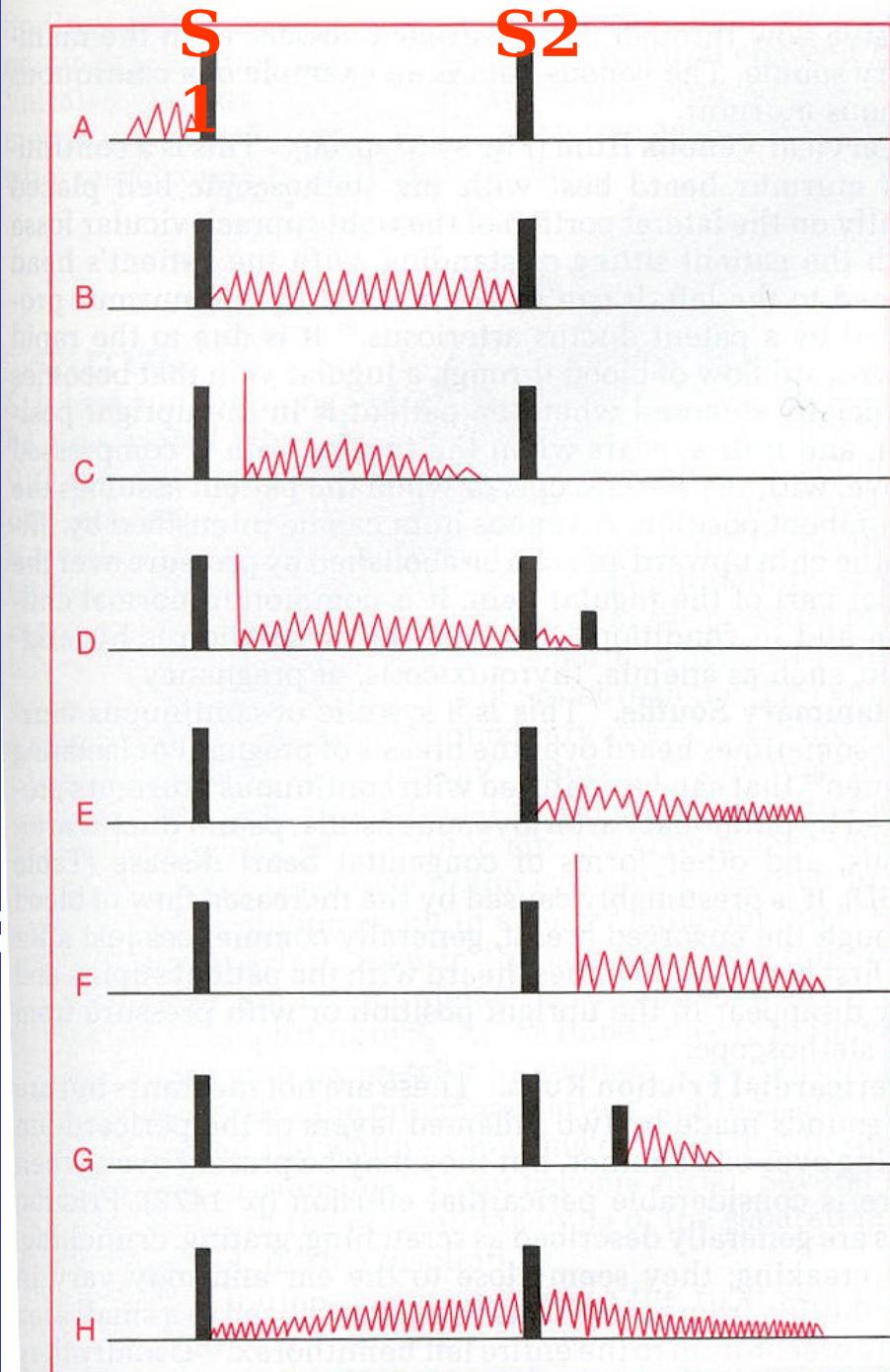


FIGURE 2–24. Diagram depicting principal heart murmurs:
A, Presystolic murmur of mitral or tricuspid stenosis.
B, Pansystolic murmur of mitral or tricuspid incompetence or of ventricular septal defect.
C, Aortic ejection murmur beginning with an ejection click and fading before the second heart sound.
D, Systolic murmur in pulmonic stenosis spilling through the aortic second sound, pulmonic valve closure being delayed.
E, Aortic pulmonary diastolic murmur.
F, Long diastolic murmur of mitral stenosis following the opening snap.
G, Short mid-diastolic inflow murmur following a third heart sound.
H, Continuous murmur of patent ductus arteriosus. (From Wood, P.: Diseases of the Heart and Circulation. Philadelphia, J. B. Lippincott, 1968, p. 75.)

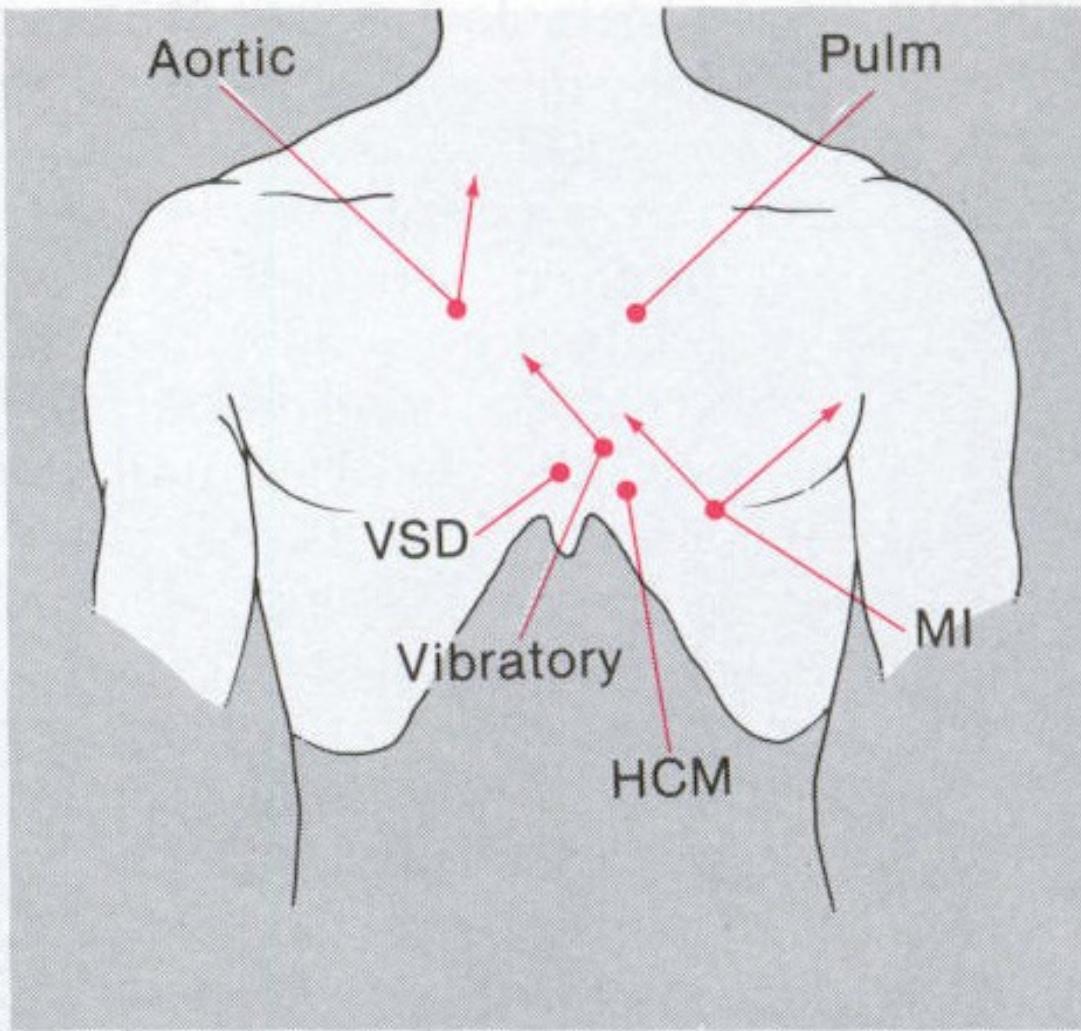


FIGURE 2–20. Maximal intensity and radiation of six isolated systolic murmurs. HCM = hypertrophic cardiomyopathy; MI = mitral incompetence; Pulm = pulmonary; VSD = ventricular septal defect. (From Barlow, J. B.: Perspectives on the Mitral Valve. Philadelphia, F. A. Davis, 1987, p. 140.)

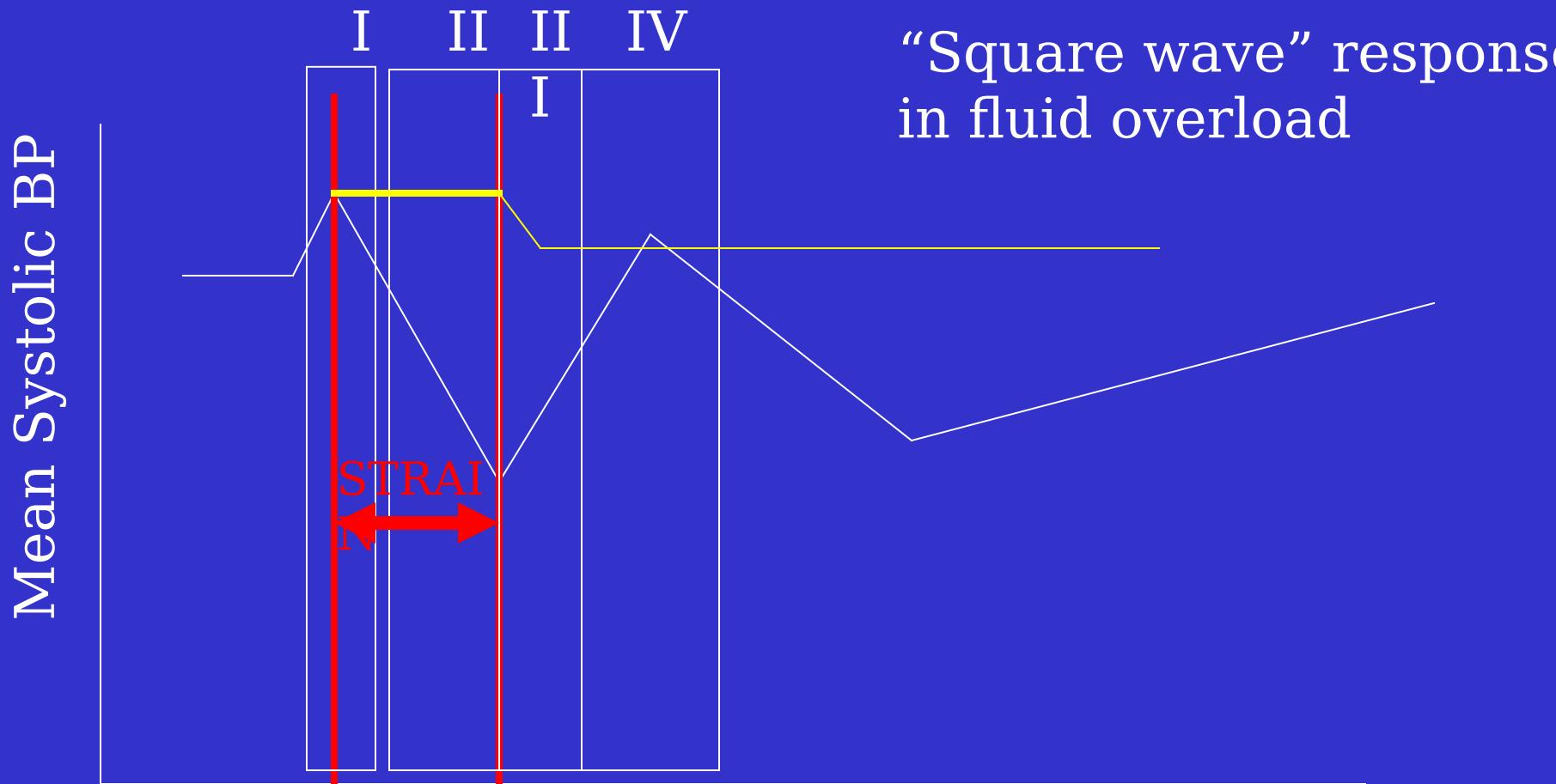
Maneuvers

- Use normal physiology to probe lesions
- **Valsalva**
 - Causes reduction in venous return to R heart, eventually left heart during prolonged strain
 - Useful for differentiating valvular AS from HOCM
 - rheumatic MR will fade, while MVP may become more prominent

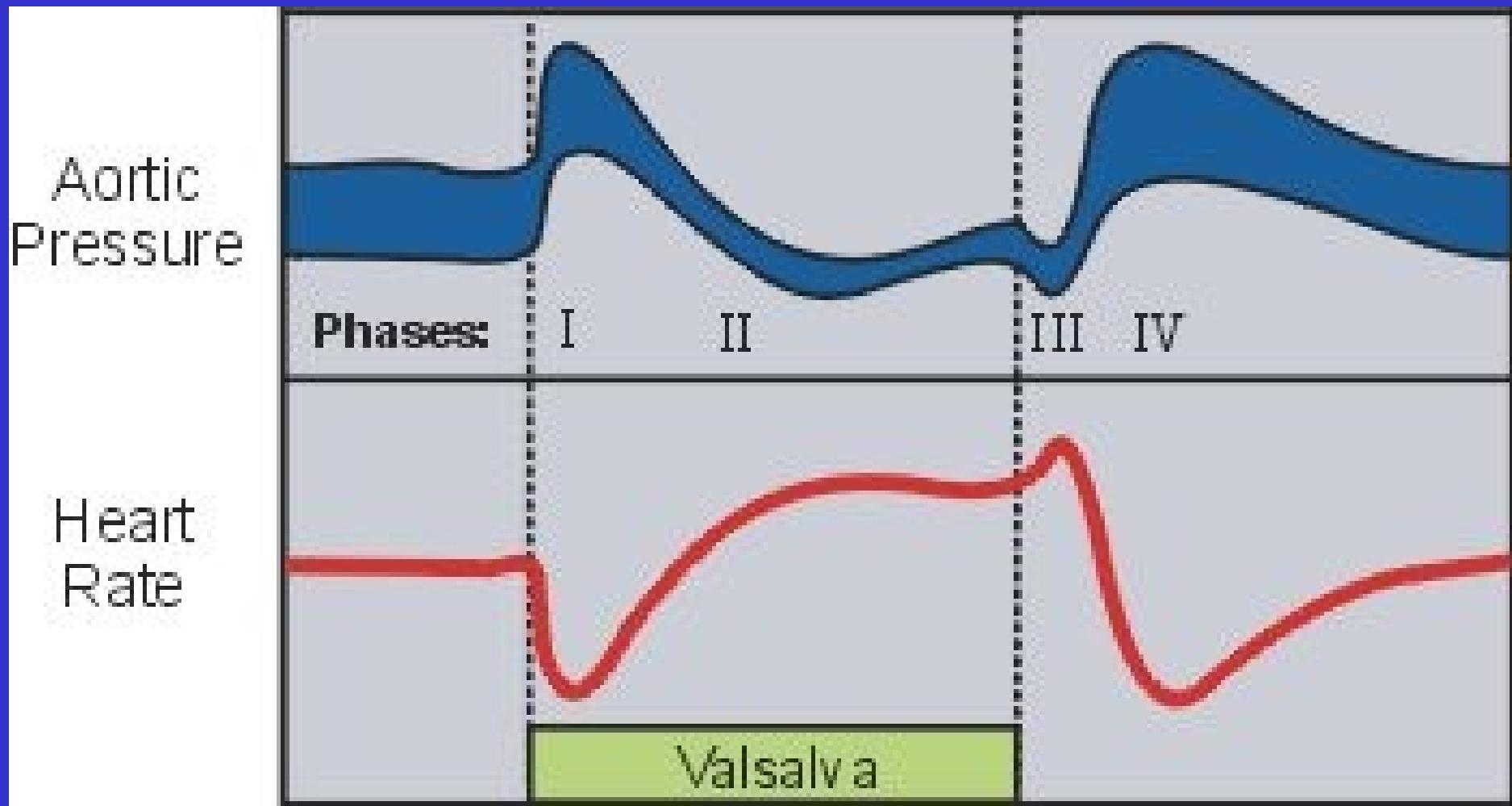
Maneuvers

- Standing and squatting
- Standing reduces venous return and systolic BP
 - Decreases AS and MR murmurs, increases HCM and MVP
- Squatting increases venous return and systolic BP
 - Increases AS and MR, decreases HCM and MVP

Valsalva: 4 Phases

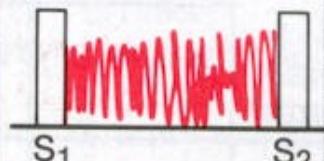


Valsalva and Heart Rate



THE VALSALVA MANEUVER

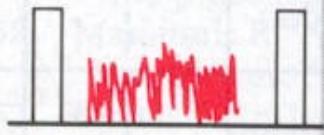
CONTROL



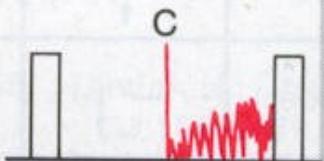
Mitral
regurgitation



Aortic stenosis

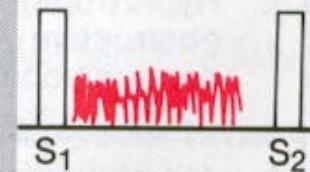


Hypertrophic CM



Mitral prolapse

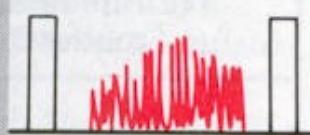
VALSALVA



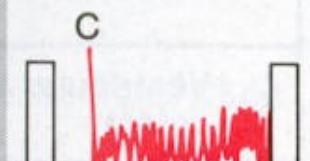
S₁ S₂



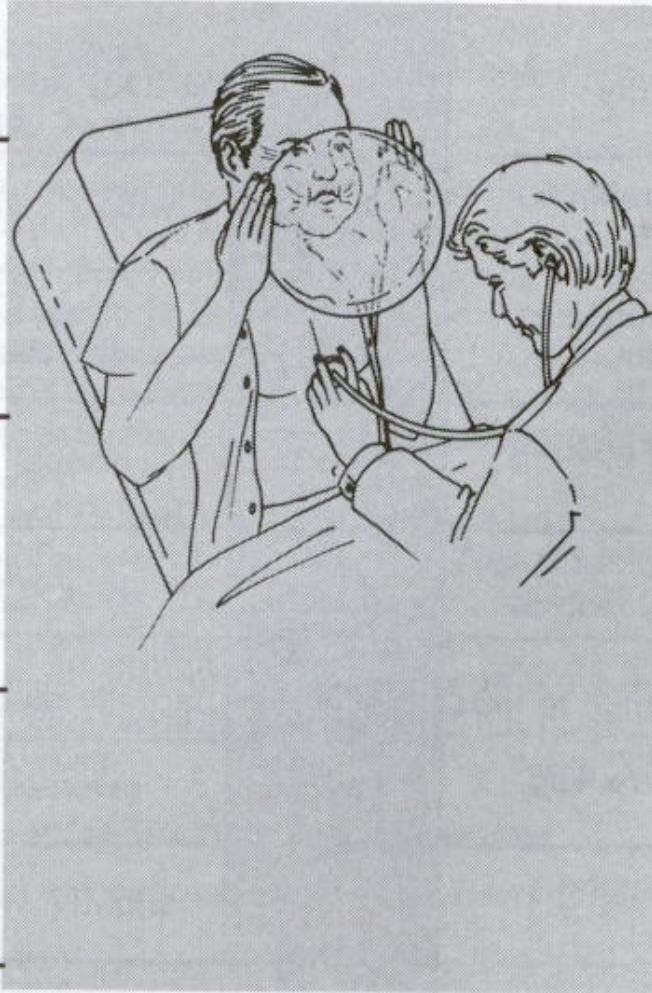
S₁ S₂



S₁ S₂



S₁ S₂



DIMINISHED VENTRICULAR FILLING

Valsalva gone wrong



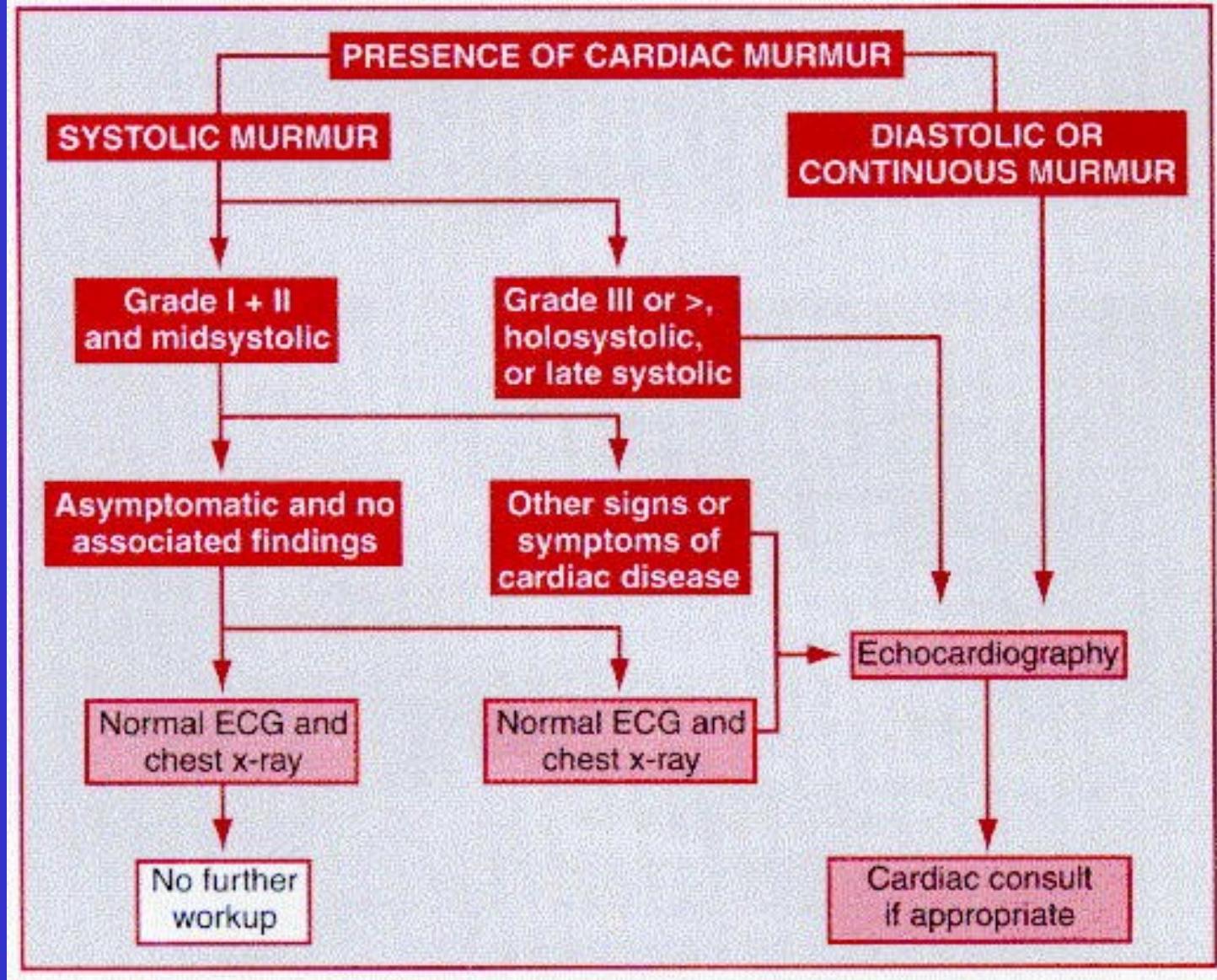
Maneuvers

- Post PVC
 - makes AS and HCM louder
 - MR is unchanged
- Handgrip
 - Have patient squeeze tennis ball without valsalva
 - Makes AS, HCM, MVP quieter, MR louder

HCM- Differential Dx

- HCM vs. Valvular Aortic Stenosis
 - Carotid upstrokes
 - Post-PVC make pulse smaller in HCM, larger in AS
 - Murmur location
 - Valsalva makes HCM louder, AS quieter

Evaluating murmurs for dummies



Heart Rhythm

- Sinus rhythm may be associated with significant respiratory variability
- If irregular, is it irregularly or regularly irregular?
- PVCs tend to be followed by a pause. Next beat is augmented (except in HCM)
- PACs often don't have pause
- Ventricular tachycardia has variable S1 intensity

Conclusions

- Cardiac physical exam founded on
 - Understanding of the cardiac cycle
 - Careful history
- Patients with murmurs or abnormal PE and dyspnea, syncope, chest pain need prompt cardiology evaluation
 - Consider echocardiography for all undiagnosed continuous, diastolic, or holosystolic murmurs
 - Grade III ejection murmurs or suspected HCM

Hypertrophic Cardiomyopathy

- Autosomal dominant disorder of myosin
 - Variable penetrance
- Leading cause of sudden death in athletes in US
 - Associated with syncope, chest pain, and dyspnea
 - Exercise associated syncope, chest pain

HCM- PE findings

- Midsystolic ejection murmur due to transient obstruction of outflow in mid systole
 - Heard best at LLSB and apex (may have some MR as well)
 - Carotids have brisk upstroke but may have “double” peak (bisfiriens)
 - Murmur often much worse during valsalva or any maneuver to decrease venous return/increase contractility
 - Fourth sound usually present due to diastolic stiffness
 - Third sound often present as well

